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PHOTOGRAPHIC  
PRINTERS'  
ASSISTANT.

BY

WILLIAM HEIGHWAY,

AUTHOR OF

*"Practical Portrait Photography," "Esthetics of Photography,"*  
*&c., &c.*

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FIFTH EDITION.

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LONDON:  
PIPER & CARTER, 5, FURNIVAL STREET, HOLBORN.

1892.

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22 & 23, Soho Square, London, W.

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## PREFACE.

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THE desire has been expressed by some among the readers of "PRACTICAL PORTRAIT PHOTOGRAPHY," for fuller details of the manipulations in the process of printing from the negative.

In response to this kindly invitation, the pages following have been prepared from notes of practice.

Rather than the production of formulæ, new and empirical, the writer has striven to plainly set down methods of working which have proved of service.





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# PHOTOGRAPHIC PRINTERS' ASSISTANT.



## CHAPTER I.

### THE SENSITISING ROOM.

IN general far too little attention is given to the convenience and suitability of the several rooms set apart for the manipulations of the printing process. In many galleries, well-found, and even luxuriously furnished in other respects, the printers are poked away into some awkward corner, and left to do the best they can with the most indifferent accommodation. To say nothing of the comfort of the workers, to whose health no consideration is paid, the character of the work produced is materially affected. The conditions which produce discomfort to the printer are, in a degree, prejudicial to the work. If the printer is, in the winter, frozen, so, too, are the chemicals; and under the hot breath of the summer sun, when the worker is faint, paper and chemicals also are affected. The quality of the manipulations is, at the same time, consequent, in no small degree, on the comfort of the operator. It can hardly be expected that the best work will be produced when a printer labours under every disadvantage.

The temperature of the rooms set aside for the silvering of paper, and other manipulations, is a matter of great importance, as changes of temperature—especially to great

extremes of heat and cold—have their influence for harm on paper and chemicals.

Almost of equal importance to the proper arrangement and fitting of the studio is the handiness and completeness of the printing departments.

When a photographer earnestly intends to produce really fine work, the state of his printing rooms should have his early attention, and they must be rendered as convenient and complete as possible.

A most important point to be observed is to keep apart the different manipulations as much as is possible. Though we often find much good work is, at times, produced under the most adverse circumstances, yet much finer would doubtless have been done with greater conveniences.

*The Sensitising Room* is a dark chamber, lighted either by gas or a window shaded by movable blinds. Where there is a window, the lower half of it is shaded by a yellow calico blind, and a darker blind, which may be drawn down according to the strength of the light, fixed above. The light by which the manipulation of silvering the paper is performed should be soft and diffused.

The dish holding the sensitising solution is placed on a table near the window, where there is sufficient light for working. Above the dish are fixed two or three clips to hold the wet paper while it drains. The position of these should allow the sheets, when held by one corner, to just touch the edge of the dish, so that drainings from the paper run down the side of the dish without splashing the back of the sheet of paper floating on the solution.

The bath, when the sensitising of the paper is completed, should be filtered back into a white glass bottle, and

strengthened, if necessary, ready for use when required. The dish in which the paper has been sensitised is rinsed clean, and put away in a cupboard where it is protected from dust. A sheet of bibulous paper should be placed under it.

Only the utensils required for use in the manipulations conducted in this chamber should be kept here ; all others ought to be banished, as they only harbour dust, and are in the way.

Bath-dishes, bottles for the sensitising solution, funnels and filtering papers, graduated measures, hydrometer for testing the strength of the bath, litmus papers, and paper-knife should be handily placed so that they may be readily found when required for use.

The filtering of baths, negative and positive, may safely be conducted in this room ; but boiling the disorganised bath had best be done elsewhere—in an open and well-ventilated place, apart from any manipulations.

The sensitising room—and, indeed, all the chambers set apart for the manipulations of printing—should be kept scrupulously clean and free from dust. The floor had best be mopped over with a damp mop every morning—not swept, as a broom only sets the dust in motion. All shelves and cupboards should be frequently wiped over with a damp cloth.

## CHAPTER II.

### THE SILVER BATH.

IN printing on paper prepared with albumen, in which a certain quantity of a soluble chloride has been dissolved, and subsequently floated on a solution of silver nitrate, there results a formation of silver chloride in an exceedingly fine state of division, which darkens on exposure to sunlight. The visible effect of light is to darken the white surface of the silver chloride, and a violet-coloured substance is formed, and, if immersed in water, free chlorine will be found to have been liberated.

The action of light is quite superficial, for, although the action be continued until the depth of colour is intense, the amount of reduced silver forming it is very small.

Our first consideration is naturally to the strength of silver which will produce the best effects. In this we find great diversity of opinion, some workers inclining to a strong, and others to a weak, bath. To a certain extent, the strength of the bath depends on the character of the paper used; that rich in chloride requiring a stronger solution than the weakly salted paper.

At first sight, it might be assumed that the strong bath



would sensitise the paper in a shorter time than the weaker solution, so that, in respect of time expended in the operation, there would be a gain; but such is not the case. Further, we might suppose that on a weak bath the paper would take up less silver than when sensitised on a strong bath; this, too, is incorrect, for a certain definite amount of silver combines with the chloride and organic substances used in coating the paper, whether the bath be weak or strong.

A strong solution of silver has the effect of hardening the albumen surface, so that, for a time, there is repulsion between the paper and the bath solution; while the weaker solution, not affecting the albumen in this way, is readily absorbed, and if the floating of the paper be long continued, the solution will penetrate the albumen and dissolve it.

There are, however, disadvantages, both in the long floating of the sheet on a stronger bath, and the short floating on the weak. With the former, though we get brilliancy and boldness of the image, the bronzing in the shadows is a most serious defect; and with the latter the prints are weak and poor, and have a sunken appearance.

The weak bath, too, feels the loss of silver taken up by the paper to a greater extent than does the stronger, and is not only more liable to contamination by causing a greater dissolution of albumen, but is more affected by the presence of impurities. In some cases the slightest excess of the time of floating the paper dissolves the albumen from the surface, and spoils paper and bath.

For general use, we find in one of medium strength the remedy for these disadvantages, and a good, serviceable bath, easily kept at its normal strength, suitable for most work,

not subject to variation nor prone to getting out of order, and when disorganised easily restored :—

*The Plain Silver Bath.*

Silver nitrate	...	...	...	40 grains
Water	...	...	...	1 ounce

A small amount of solution is productive of many of the evils noted as characteristic of the weak solution. The amount of silver in it, being small, is soon exhausted. It is contaminated after sensitising a sheet or two of paper only, and requires doctoring every day or so. The depth of solution should not be less than an inch, and it is best to sensitise in a bath which will contain at least a half sheet.

For strengthening the solution when required, a stock solution of silver nitrate, sixty grains strong, dissolved in *distilled* water, should be kept, as a great deal depends on maintaining an even strength. By this means only can certainty of working be attained. The hydrometer indicates, with sufficient exactness for this purpose, the strength of the solution.

A great deal has been written about the water best adapted for use in the sensitising bath for printing, as well as for negatives. Generally, particular direction is given that distilled water must be used. That this is best there can be no question; but the writer has found ordinary cistern water serve the purpose exceedingly well, if treated in the manner here given. When the silver is dissolved, make slightly alkaline by the addition of a drop of ammonia solution (one drop of ammonia in ten of water), and expose the solution in a clear glass vessel to daylight for a few hours. The solution will grow muddy, and then a brown precipitate will



be thrown to the bottom of the vessel; decant the clear liquid, and filter.

By the plain silver nitrate bath, the finest results are obtainable from any negative of proper density.

In the height of summer, the strength of silver, and the time of floating the paper, should be slightly decreased, and in the winter increased; in the one case forty-five grains of silver to the ounce being used, and in the other thirty-five.

With the silver nitrate other nitrates are sometimes used, to suit special brands of albumenised paper.

One of the most generally used baths is the following:—

Silver nitrate	...	...	...	40 grains
Ammonium nitrate	...	...	...	20 ,,
Water	...	...	...	1 ounce

made slightly alkaline by the addition of liquor ammoniæ. And to the same formula, the addition of five grains of lead nitrate has been recommended.

This bath is well adapted for use with most brands of paper, but requires care to keep it in working order above that of the plain bath. Considerable observation and skill are necessary when a complicated bath comes into use, and for the printer whose experience is limited, it is best to use a paper thoroughly understood, and a good reliable bath which calls only for modification in extreme weather, and with exceptional negatives.

In the narrow scope of these hints, it would not be possible to give the many variations of formulæ used for printing; but this need not give the reader a feeling of the incompleteness of the information given, as a great number of formulæ are misleading and confusing, rather than edifying.

We shall, therefore, confine ourselves to the consideration of the formulæ already given.

The solution should be kept, as far as possible, on the surface of the paper. This necessity influences the duration of the sensitising, especially where the bath is weak, and the tendency of the solution is to dissolve the albumenised surface. "Woolliness" and want of vigour in the image, and the in-sunken appearance of the print already mentioned, mark this fault.

To prevent this, alum is sometimes added to the silver solution, its action being to harden the albumenised surface of the paper, and prevent the silver sinking through. It is generally added by placing a small lump of alum in the filter when filtering the bath. It is only necessary to do this when the prints show the want, and only then when the fault is known to be in the bath; or too much will be dissolved.

The bath solutions, we have seen, are made alkaline. This should not be very decided, and the addition of the alkali should be carefully made. Liquor ammoniæ should not be poured in undiluted, but drops of a solution in water, one in ten, used when the silver solution shows an acid reaction. This is ascertained by the use of litmus paper; the red paper ought not to change to blue quickly and strongly. For rendering the bath alkaline, bicarbonate of soda is sometimes used, but the ammonia solution is to be preferred.

By some workers an acid sensitising bath is recommended. The effects obtained cannot be compared with those from an alkaline solution, nor is the paper so sensitive. The value of a bath acidified with citric acid will, however, be found in the keeping qualities of the paper sensitised on it. In changeable weather, when there is some uncertainty as to

the use of the paper sensitised with sufficient rapidity to prevent its becoming discoloured, the acid bath is extremely serviceable. For paper intended only to be kept a day or two after sensitising, the bath should contain the faintest trace of acid. A piece of blue litmus paper placed in the solution ought not to turn red under thirty or forty seconds. Fume the paper as required for use.

The use of nitric acid in the bath is not recommended, as the prints resulting are weak and poor, and tone tamely.

Glycerine and alcohol are sometimes added, but the advantage gained by the use of either is extremely questionable in general work.

The acid bath, except for special purposes, is to be discommended for three important reasons: first, that the results are not so fine as those obtainable by the alkaline bath; second, that the action is slower; and third, the bath is not so easily purified.

The alkaline bath may be placed in the sun, and all impurities are, by its action, thrown down, and may easily be filtered out. Care in all cases will do away with the necessity for continual doctoring of the solution. Filter after each time of using, and strengthen; but do not worry the bath until it begins to worry you. Test with litmus paper every now and then, to see that the proper degree of alkalinity is maintained.

A great amount of trouble and uncertainty is spared the printer who is careful that the sensitising dishes are kept clean. Directly the sensitising of the paper is completed, return the solution to the bottle through the filter, rinse the dish clean, and set it on edge on bibulous paper to drain in a cupboard where it is protected from dust.

## CHAPTER III.

### TREATMENT OF THE DISORDERED BATH.

THE sensitising bath soon becomes discoloured by the dissolution of albumen from the surface of the paper. With some brands of paper, after a few sheets have been sensitised, the solution assumes a deep colour, and the purity of the whites of the print is seriously affected. This, in the case of vignettes, is a fatal defect.

As we have already urged, care is necessary in the use of the bath; but this evil of colour is especially attributable to the alkalinity of the bath, ammonia quickly affecting the albumen. It is, however, too useful to be discarded, and for this reason, in using it, we should be careful that too much be not added.

Decolourisation of the bath may be effected in several ways; but of these, three commend themselves on the score of efficacy, ease of application, and economy.

For the renovation of a comparatively new bath, the application of a dilute solution of potassium permanganate and kaolin will be found most useful, and to serve every purpose; and for a somewhat worn bath, partial evaporation or boiling.

*Potassium Permanganate*.—The great advantage the use of the permanganate offers is that of readiness. With a stock solution at hand—

Potassium permanganate ...	...	20 grains
Water ... ..	...	1 ounce

we may, without great delay, purify the bath even while it is in use; but this need only be done in time of great pressure.

Ordinarily the usage is, if after the completion of sensitising the paper for the day the bath be much discoloured, to add two drops of the permanganate solution to the bath, and thoroughly mix by stirring with a glass rod. The bath assumes a deep rose tint, which in a short time lightens. If it rests at this, sufficient has been added; but if the tint dies out entirely, another drop must be given, or yet other drops until the solution is coloured. The quantity depends, of course, on the bulk of the bath solution. The tinted bath solution, placed in a clear white glass bottle, is stood in sun or daylight until the rose tint disappears (say, after an hour in sunlight) and the solution filtered clear.

Should the bath become discoloured during the sensitising of the paper, the application of a drop or two of the permanganate solution will often suffice, even without filtration of the bath. It must be well mixed by stirring. It is very important that too much should not be added. Experience will, after a short time, guide the operator in this, so that he will know exactly how many drops should be poured in. Properly used, the permanganate is invaluable for the purpose of decolourising the bath; it is, therefore, a pity that its use should fall into discredit because of the bad



effects which arise from the haphazard application of it in some cases.

*Kaolin*, or porcelain clay, the purest form of disintegrated felspar, is, too, a useful agent for purifying the bath.

A little of the kaolin is placed in the bottle containing the bath solution, shaken up together for a little time, and then allowed to settle. The clear liquid is decanted and filtered.

The kaolin may be left in the bottle, and the solution added to it several times.

This method is, however, a very dirty one, and disagreeable, and takes up more time than does the permanganate.

Kaolin sometimes contains chalk, and this renders it unfit for the purpose of decolourising acid solution of silver nitrate. The impurity may be removed by treating the kaolin with a weak acid, and washing.

After a time the bath will, from various causes, require more thorough renovation; but until the methods just described fail, it is well not to resort to boiling. On the one consideration alone that it is a troublesome process, it should be regarded as a last resort. Though simple enough in itself, the process is, by want of care and lack of ordinary precautions in operation, made the cause of a great amount of failure and uncertainty.

When all else fails, and the sensitising solution is seriously affected by the presence of organic matter, it may be restored by heat. In this process it is only necessary to carefully carry out the directions given, and guard against the entrance of foreign substances.

*“Boiling” the Bath.*—At times a partial evaporation of the solution is all that is required. In this case it is only necessary to pour the solution into an evaporating dish, and

place over the lighted jets of a gas-stove. Should the bath not be alkaline, it must be rendered so by the careful addition of a solution of liquor ammoniæ, with the precautions already enjoined. When the liquid is thoroughly heated it will grow turbid and black, with a metallic scum on the surface. Under this scum, after a time, the solution will clear, the impurities being thrown down. At this stage, or when about one-quarter or one-third of the solution has evaporated, the gas of the stove may be turned off, and the solution allowed to cool.

When perfectly cool, filter; and, having ascertained the strength of the silver, add sufficient distilled water to reduce to the original strength of the bath.

If distilled or pure water is not at hand, ordinary cistern water may be used, but it should be added *before* subjecting the bath to heat; diluting the solution, in the first place, and boiling down as nearly as possible to the proper strength. In this way we get rid of the impurities of the water with those of the bath.

*Fusing the Bath.*—The operations described in the previous process are in this carried out, but the evaporation is continued to dryness. The bath is now fused until all frothiness disappears. Heat should now be withdrawn, and the mass scraped down into the centre of the dish. When sufficiently cool, enough nitric acid solution (one part in ten or twelve of water) should be added to re-dissolve the silver with the aid of heat. Again evaporate to dryness, and dissolve once more in pure water, and filter.

The bath may now be made up to the required strength, the organic matter having been rendered insoluble by fusing, and the excess of acid dissipated.

In boiling baths, certain precautions are necessary, or accidents are likely to occur. A good porcelain dish should be procured, and this will bear almost any amount of heat; but a sudden wave of cold air on the heated surface may crack or break it.

Although it is not necessary to stand and watch the process of boiling down a bath, it should not be forgotten entirely, as, when all moisture has been evaporated, the dish will break if longer subjected to flame.

The stove best adapted for the purpose is an upright iron stove, with several jets of gas at the bottom, the flame of which does not touch the dish.

Sometimes, by way of extra precaution, is used a "sand bath," or iron bath filled with fine sand, in which the porcelain dish is stood. By the use of the sand bath a more uniform heat is maintained, and danger of cracking the porcelain dish is averted.

Iron dishes, lined with porcelain, should not be used, as the surface is liable to fracture.

When nothing can be done to make a bath work, the best plan to adopt is that of the—

*Precipitation of the Silver in a Metallic State.*—Filter the solution, and place in it strips of copper. After twenty or twenty-four hours, test the solution for absence of silver by taking a few drops in a tube, and adding a solution of common salt. If there is no white precipitate, the silver has all been reduced to a metallic state. Decant the liquid, and wash the silver until the greenish colour observable, which is due to copper nitrate, disappears. Place the metallic silver in an evaporating dish, and gradually add one drachm of nitric acid for each 150 grains of silver nitrate of the



original solution, to dissolve the metallic silver. Dissolution is aided by gentle heat. Boil down the solution to free it of nitric acid, add distilled water, and then silver oxide, gradually, until the greenish tint disappears. Filter, and make up to the proper strength.

Or, by placing in the filtered solution clean, bright strips of zinc, the silver will precipitate, as with the copper in the foregoing. To get rid of the zinc, after picking out the undissolved pieces of zinc, add a mixture of hydrochloric acid, one part in ten of water, and boil; pour off the acid, and well wash the silver. Place the mass in a filter, and wash well with boiling distilled water. Dissolve with nitric acid, as already described, filter, and make up to the required strength.

## CHAPTER IV.

### ALBUMENISED PAPER.

It is not intended here to enter at length upon the preparation of albumenised paper, as far more satisfactory results may be obtained on that commercially prepared than the operator could hope to attain by preparing it himself.

It will, however, be useful to note a few of the characteristics of two well-known and generally used papers—the Saxe and Rives—with some remarks on the mode of albumenising, as much of the success depends on the observance of these peculiarities.

Proper thought is not generally given to the special adaptability of a paper for a certain purpose. Manufacturers will, of course, urge that their paper is suitable in a like high degree for all kinds of work; but this is not so.

A few suggestions in one or two instances will serve for all.

The two papers we have mentioned are both subject to defects, which appear to be the result of the method by which they are prepared. A knowledge of these imperfections, and their cause, may probably save the operator annoyance and failure, and also be instructive in cases not immediately connected with it.

Between the two papers mentioned, the great difference is in the degree of toughness. The Saxe, being the stronger of

the two, is therefore superior for prints of large size. It is, too, also almost entirely free of iron spots. Fine detail in the finished print on this paper may be secured. There is, therefore, no question of its good quality. This is with neither of the papers a matter of question.

The Rives paper, when wet, is very tender, especially when in large pieces; but, as it gives a more brilliant surface than the Saxe, it is often prepared for small prints.

To explain the cause of some of the defects of commercial albumenised paper, it is necessary to briefly allude to certain details of its preparation. The paper is floated on a solution of salted albumen—ammonium chloride dissolved in water, and the albumen of eggs, nearly fresh, beaten up together, and perfectly mixed; sometimes a little alcohol is added. If the mixture is not perfectly beaten up, flakes of animal membrane will be left in the liquid, and these are the cause of streaks on the surface of the paper; generally observable on examination. The trouble these streaks cause is known to every printer of any experience. Care should be exercised that they are placed on a comparatively unimportant portion of the negative.

A pause in laying the paper on the albumen solution is the cause of a line across the paper; this bronzes strongly under the influence of light when the sheet is sensitised and exposed.

Bubbles of air formed under the paper during the floating, if not removed, cause a round spot of unalbumenised surface, which in the print forms a defect.

Too extended floating on the albumen bath causes the solution to sink into the paper, by the alkaline solution dissolving the sizing of the paper.

The method used in drying the albumenised sheet has also considerable influence over its character. The sheet having been floated on the salted albumen, is sometimes suspended by two corners, with pins, to dry; and sometimes it is hung over a rod to dry.

By the first mode of drying, where one edge is higher than the other, we get a thicker edge of albumen on that portion of the paper which was lower while the sheet was drying, and the upper edge sometimes very thin. This inequality in the thickness of the albumenised surface causes a disparity in the quality of the prints, sometimes very great; the lower and thicker edge giving prints of great brilliancy, depth, and beauty; while those from the thinner edge, or that uppermost in drying, are comparatively poor and tame, in consequence of the thinness of the albumen surface.

With paper dried by the second method—the sheet being hung over a rod with both edges hanging down—the albumen runs down from the middle of the sheet to the edges. Here we sometimes find a line of clotted albumen where the sheet has rested on the rod. Such a sheet had best be cut through the middle of the rod-mark to get these clots at the edge of each half-sheet.

Every sheet of paper should be examined for these marks before it is cut up or used, and the defects avoided or dodged, so that they are not allowed to appear in the middle of a print.

The portion of the paper richest in surface should be used for the most important part of the picture.

A little observation in this regard will conduce to success, and the absence of thought will be punished by the unnecessary spoiling of many prints.

## CHAPTER V.

### SENSITISING THE PAPER.

PLACE the sensitising bath on the table, in a convenient position, where there is sufficient yellow light by which to work (see the chapter on the Sensitising Room). The bath should be lengthwise to the operator. Pour in the solution, on the surface of which no scum or bubbles should appear.

The paper should not be hard and dry, nor moist. In summer it is best to place the sheets required for use in a cool and rather damp place for some hours before sensitising.

Before placing a sheet on the bath, turn up a small portion of each of the four corners, so that in examining the paper and lifting it from the bath, it is not necessary to dip the fingers into the solution to take hold of the paper. If the sheet is at all dry, rub the thumb-nail gently round the edges of the paper, at the *back*, to prevent any sharp angles which might be submerged, and allow the solution to run over the back of the paper.

The length of the bath is before the operator, to his right and left hand, and the paper should be held in such a manner that it may be readily laid on the surface of the solution.

Take two diagonal corners between the thumb and first

finger of each hand, the right being slightly the higher, and let the paper assume a gentle curve between. Place the portion of the paper near the left hand on the centre of the solution, and as the sheet is gently drawn to its place on the bath, steadily lower the right hand until the whole of the sheet (with the exception of the four upturned corners) is in contact with the solution.

By this means it will be found that the entire sheet is drawn over a portion of the bath. This is done so that the small air-bells, which form under the sheet, may be driven to the edges.

If, as is sometimes done, the middle of the sheet is placed in contact, and the two edges lowered together, the bubbles of air are held in the centre, and much trouble and loss of time result in getting rid of them.

After a few seconds, one or two corners may be raised to see that the sensitising is progressing evenly.

Should there be, by any accident, any spots of silver on the back of the paper, they should be removed by blotting up dry with bibulous paper.

Sometimes the sheet, after being placed in contact with the bath, shows a tendency to curl back. The paper is too dry, and should have been placed in a damp atmosphere some hours before sensitising. To make the sheet re-assume its position on the bath, gently breathe on the back of the curled portion until it falls back on the bath.

The time of sensitising depends on the strength of the bath, and the temperature of the bath and atmosphere. It is also influenced by the brand of paper used, the character of the negative to be printed from, and the effect to be produced in the print. All these points can only be settled by



the printer at the time; and to correctly estimate these requirements under ever-varying circumstances calls for the exercise of thought.

Roughly speaking, with the formulæ given, from forty to seventy seconds in the summer will suffice; and in the winter from sixty to one hundred seconds.

When the sheet has lain on the bath the required time, it is slowly raised from the solution by the two left-hand corners, and drawn over the edge of the dish, or, what is better, over a glass rod fixed at one edge of the sensitising dish. In this way the surplus solution is removed from the sheet.

It is then fixed by one corner in a clip, and to the lowest corner a piece of white blotting-paper is attached to absorb the moisture.

Before sensitising a sheet of paper, any scum or impurities should be removed from the surface of the bath with blotting-paper. Care in this respect will save many pieces of paper.

When the sheets are partially dry, surface moisture having evaporated, they are removed to the drying-room to be more quickly dried by means of heat.

## CHAPTER VI.

### THE DRYING-ROOM.

To dry paper spontaneously is a mistake. As we have already seen, it is necessary for the production of brilliant prints that the formation of silver chloride be on the surface of the paper. All our operations have been conducted to that end, and now, if the paper is permitted to dry spontaneously, all this will be rendered of no effect, as the silver solution will sink through the albumen and into the substance of the paper.

The sheet is allowed to drain and partially dry, and then by heat, thoroughly.

The drying-room should be a separate chamber, fitted with a row of gas jets or a stove, over which is hung a rack with clips for holding the paper.

A light rack of three or four bars, apart six or eight inches, is suspended about five feet from the floor. To the bars wooden clips are affixed at intervals corresponding to the lengths of the sheets of paper to be dried. One edge of the paper is caught in these clips, and the sheets hung down over the gas jets, which are fixed near the floor, running the length of the rack. If any injury to the paper is found to result from the light or heat of open gas jets,



a very thin iron cover may be placed over them. With this cover the gas should always be lighted a little time before the drying commences, to heat the iron, so that the operation of drying may not be delayed.

A small stove, with a piece of soapstone to cover it, may take the place of the gas; but, especially if a quantity of paper is silvered at one time, the stove is not nearly so useful as gas.

If the paper evinces a disposition to curl in drying, sticks of the length of a sheet of paper with a clip at each end are provided, which, being fixed on the lower edge of the sheet, weigh down the paper, and keep it straight. This also counteracts the tendency of the sheets to stick together when any slight draught of air agitates them.

The drying-room should be kept very clean, as any dust flying about is attracted to the damp surface of the paper, and causes defects in the print.

Care should also be exercised to guard against spots of iron-rust rising from the stove or gas pipes. Rust should not be allowed to accumulate.

In winter the drying-room should be warmed before commencing the sensitising of the paper; but in the height of summer a few seconds over the gas will suffice to dry the sheets; sometimes, indeed, even that may be dispensed with.

It is unnecessary to state that the light of the drying-room should be very feeble, white light altogether absent, or the paper will darken as it dries, and be rendered useless.

## CHAPTER VII.

### DRYING, FUMING, AND CUTTING THE PAPER.

THE sheet of paper having been sensitised, and the surplus solution drained from its surface, is removed to the drying-room.

Great care should be used in handling photographic paper, especially when silvered, and more particularly when in a damp state. The sheet may be lifted by the turned corners, or at the extreme edge, as the fingers will leave marks on the surface.

The sheets should not be allowed to stick together at any time. In transferring to the drying-room a sheet may be hung over the arm, silver side uppermost, and so carried safely. Although not particularly sensitive in this state, the damp sheet should not unnecessarily be exposed to daylight.

*Drying the Paper.*—Hang the sheets over the gas or stove by the clips fixed to the bars of the rack, and weigh down the bottom edge of each with the sticks provided for the purpose.

The clips of the rack and of the weights must be scrupulously free from dust, or the particles will adhere to the silvered surface, and waste of paper result.

The heat for drying should be diffused, but sufficient to

quickly evaporate the moisture, for when the drying is slow, the silver sinks into the paper, and the surface is lost.

If proper regard is paid to the quick and thorough drying of the paper, the surface will be brilliant, and fine, bright prints may be obtained from it. False economy may urge that spontaneous drying is best, but a trial of the two methods will firmly establish the superiority of the quickly-dried sensitised sheet over that allowed to dry spontaneously.

*Fuming.*—The advantage of fuming is now scarcely questioned. Fumed paper prints more quickly, and from it more brilliant prints are obtainable. The toning of fumed paper is more easily and satisfactorily conducted; and, as the toning is to the fullest extent under control, every variety of tone may be secured. The results are decidedly finer and richer.

For the purpose of fuming paper, a box of sufficient size to hold several sheets is provided. A rack fitted with clips, and weights similar in character to those described for holding the paper when drying, are provided to receive the sheets, each clip holding two sheets placed back to back. The clips need not be more than two inches apart. A false bottom, perforated with holes made by a large gimlet, is fixed, and under this, on a tray, is placed the dish of liquor ammoniæ. The tray should be arranged to slide in and out, so that the ammonia dish may be put in the centre of the bottom without difficulty. There should be three or four holes at the bottom, and a few smaller holes in the lid of the box, to create a draught. In most fuming-boxes this is not provided; but the advantage of having a gentle current of air through cannot be over-estimated. The current of air causes the fumes to circulate and evenly combine with the silver, and prevents dampness of the sheet.

This mode of fuming with the paper in a perpendicular position is far superior to that in which the paper is laid horizontally ; the paper is readily fixed in position, a more even distribution of the fumes is secured, and the fuming is effected in a shorter time. The paper is placed under the influence of the ammonia fumes for ten or fifteen minutes.

In damp weather it may be found necessary to slightly dry the paper after fuming. The paper also evinces a tendency to turn yellow at such times, and, to prevent this, a few grains of chloride of lime may be added to the ammonia. Its use is, however, *not recommended*, as it tends to enfeeble the print. If used, the amount added to the ammonia should be carefully regulated, and its action on the paper jealously watched.

*Cutting the Paper.*—The sensitised sheet is very susceptible to stains. Every place on which it is put should be very clean. The fingers should never touch the sensitised surface. A margin, above the size of the print required, should always be allowed (larger as the size of the print increases), to allow for tears and frayed edges.

An ivory paper cutter is best adapted for the purpose of cutting, and each crease made should be decided and accurate.

It is a dangerous experiment to try to secure the largest possible number of pieces of paper from a sheet, as the failures which generally result from defective prints more than balance the hoped-for gain.

Printing on paper cut to the exact size of the required picture is, there can be no doubt, a very bad plan ; the waste, even with the greatest care and skill, is considerable.

## CHAPTER VIII.

### CONSIDERATION OF THE NEGATIVE.

PERFECT negatives are the exception rather than the rule; and, although it would be mischievous to advise the printer to encroach on the ground of the retoucher, yet he should exercise some supervision over the *cliché* provided, and from which he is expected to produce good prints.

Such instruction as the rectification of false lights, and the lightening of shadows, are pernicious, as it suggests that the printer should correct the work of the retouching artist. This is palpably ridiculous. If the retoucher needs this correction of the printer, depend upon it he has committed greater blunders against art, and should, therefore, be removed.

We must, therefore, infer that the negative has received proper attention at the hands of the artist, or refer the printer who possesses the very laudable ambition to excel as a retouching artist to the chapter on retouching in "Practical Portrait Photography."\*

It must not, however, be thought from this that printing consists merely in putting negative and paper in contact in a frame, and knocking off so many prints a day.

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\* Piper and Carter, 5, Furnival Street, Holborn, E.C.

The negative should be studied, and thought given to the treatment best adapted to it.

A negative much retouched in the background had best be vignettied, to get rid of as much as possible of the defective portion.

*Thin Negatives* should be printed in a very weak light, or under white tissue paper.

A strong bath is best for sensitising the paper for thin or "weak" negatives, and the fuming extended to about double the ordinary time.

Much, of course, depends on the character of the thin negative; if it is the result of intention, and not of accident, the probability is that its only fault (if fault it be) is its thinness. From a negative such as this, there is no reason why, with care, good prints should not be obtained. As a quality of the negative, thinness is a good one if the artist and dark room man are skilful, as all the delicate gradations of light and shade are more fully developed than in the more intense negative.

If the thinness is the result of accident, the negative is in all likelihood worthless, and no amount of doctoring will improve it. Should it be absolutely necessary to print from a weak, flat negative, it should be carefully retouched, and covered on the glass side with a varnish tinged with iodine. This should be scratched from the shadows. Retouching on this surface in pencil or Indian-ink may often aid in making up a picture. Masks of tissue paper pasted on the glass side over the light portions of the negative, and worked upon, sometimes give results worth the trouble of the operation.

*Intense Negatives.*—These, with strong lights, and black,



abrupt shadows, little detail, and plenty of harshness, are very unsatisfactory and profitless.

With such negatives our object must be to reduce the contrast as far as possible; and, as we have seen, the slower the printing, the greater the contrast produced; here we print quickly to subdue the peculiarities of the negative.

A pink paper is sensitised on a weak bath, and the fuming reduced to the shortest time. It is sometimes well to discolour the paper by a slight exposure to light, especially if the paper used is white. The pink paper, or the faint discolouration of the white, does away with the blankness of the lights, and gives a suggestion of detail.

Place directly in the sun's rays, and print for the shadows. If any defects in the glass prove troublesome, a sheet of tissue paper must be placed over the negative.

*Broken Negatives.*—At times it is necessary to print from a negative which has been broken. If the fracture is simple, and of such a character that binding the edges holds all the pieces, the procedure is comparatively easy. Cut four pieces of stout paper the length of the sides of the negative, and one inch wide. Apply strong glue, and, having placed the pieces of the negative properly in position on a light board, stick one of the paper strips to each edge, one half of each strip overlapping. Rub down to thoroughly stick the paper, turn the negative over, and stick down on the other side the overlapping strips.

The negative may be turned over without difficulty by the use of two light boards slightly bigger than the negative; or two glasses. One is placed under, and on it the broken negative adjusted. When the first half of the strips of paper are fixed, place upon the negative the other board, turn the

negative between the two boards over, lay them on the table, remove the top board (that which was before underneath), and finish the operation.

A negative broken into many small pieces is first put together properly, and a piece of unsalted paper coated with strong glue stuck firmly on the glass side, edges all round overlapping. Turn the negative over and rub down the overlapping edges on the collodion side, care being taken that it does not encroach on any portion required in the print. As the paper dries it will contract, and more closely draw together the pieces. With castor oil, &c., the paper may be rendered semi-transparent.



## CHAPTER IX.

### THE PRINTING ROOM.

HERE are conducted the operations of preparing the negatives for printing, fixing masks, preparing vignettes, filling the frames, examining prints under exposure, &c., &c.

As will be seen at a glance, in most of these operations strong light would be hurtful. To guard against the danger of light affecting paper or prints, the room is darkened by yellow curtains over the windows, and receptacles are provided for paper and prints.

Convenient drawers for the different kinds of paper in use, and one for prints, should be fitted in the room.

The drawers should be constructed with a lid in two parts, hinged in the centre, so that when the drawer is pulled out, light cannot penetrate to the interior. The front part of the lid had best be so made that it cannot remain open unless held. With this arrangement, even if the drawer is inadvertently left open, little or no damage is done, as the lid still protects the interior of the drawer. The top of the lid is flush with the top edge of the drawer, not to impede the movement. Such a lid is so easily made that no printer need have the paper and print drawers unprotected. Failing material or skill for one as described, a piece of stout card-

board to fit the drawer may be used to cover the sensitised paper in the drawer.

It is a wise precaution, and one entailing no trouble or loss of time, to place paper and prints sensitised side downwards.

Shelves are fitted round the chamber for negatives, which should be placed film side to the wall. A word of caution with regard to the use of these shelves is necessary.

Every day, negatives from which the required number of prints have been made should be removed from the shelves of the printing room, and placed in the store racks. A negative out of use is in the way, and stands in danger of being spoiled.

An ivory paper-knife, a pair of scissors, glasses (ground and plain) of various sizes for the frames, tissue paper, masks, and cut-outs, should have places where they may be readily found.

Too often a great accumulation of lumber is permitted, the consequence of which is that necessary implements are crowded out or buried. In the printing room there should be a place for everything, and directly an implement is out of use, it should be returned to its place.

*The Temperature* of the room is a consideration of great importance, as the paper is readily affected by extremes. A stove in the winter, and perfect ventilation in summer, should keep the room at an uniform and comfortable temperature all the year round.

*Printing Stand.*—The stand in **A** form, with ledges on both sides for holding the negatives under exposure, should be well and firmly constructed of well-seasoned wood. Further protection may be given to it by two or three coatings

of paint. Castors are fitted to it, so that it may be easily moved on the roof to secure the most favourable light. On a stand of this construction, intense negatives, and those covered with several thicknesses of tissue paper, may be printed in direct sunlight, while the thinner negatives are placed on the other side and printed in shade.

*Printing Window.*—In changeable, cold, and stormy weather, when printing out of doors is impossible, the prints are exposed under the glass of a window built out from the printing room. From the window place, the sash being removed, and, if necessary, the opening enlarged, a platform is built. This is covered by a straight sash running from the top of the opening to the outside of the platform, the sides being boarded up. If the platform slopes downward, a greater amount of space can be utilised, the platform being then fitted with ledges on which to rest the frames.

Other stands for frames can be fitted above, and in an ordinary window-place a great many frames may be exposed.

A northern aspect, if it can be secured, should be selected, that the sun in changeable weather may not prove troublesome. This trouble, with any aspect, may be done away with by the construction of a light frame, of the size of the window sash, covered with tissue paper.

Especially if the printer has other occupations, and his attention cannot be wholly given to his frames, should the printing be done under cover.

## CHAPTER X.

### PRINTING.

IN the operation of making prints from a number of negatives, such as come into the hands of a printer day by day in an ordinary gallery, the exercise of care and thought is necessary, allied to a considerable amount of experience.

Thought and carefulness are absolutely requisite, as much to the <sup>214</sup>man who has printed for years, as for the beginner who is making his first prints; the only difference being that to the experienced printer the exercise of them is, from long usage, almost a habit, while to the novice it may be a matter of anxiety.

*Filling the Frames.*—In the operation of placing negative and paper in the printing frames, seemingly so simple, considerable care is requisite. It is an extremely easy thing to break a negative. If the glass is dropped sharply into its place, if the frame is warped, if the pad is unequal or too thick, if the backboard of the frame is improperly placed, this awkward accident may result. These instances are but a few of many causes of this one of many failures. With care they may be all avoided.

It may be accepted as a good rule, that a negative ought not to be placed in a frame without a plain glass on which to

rest. Besides securing to a great extent the safety of the negative, in ordinary bright weather the print made under two thicknesses of glass is better than that where the light passes directly through the glass and film of the negative. Certain cases, as that of a very intense negative, call for different treatment, of course. Many first-rate printers do not use these glasses in the printing-frames: ah! well, dear reader, when *you* are a first-rate printer, you—may do as you like!

The glass should be kept bright and clean on both sides. The negative must be dusted with a broad, soft brush on the collodion side, to remove any dust which would cause flaws in the print. The glass side, too, should be perfectly clean.

See that each piece of paper is in its proper place on the negative before putting the frame out in the light. Examination of each piece is necessary before placing it in the frame, as defects from the albumenising, sensitising, &c., which would pass unnoticed in the drapery, might spoil the print if appearing on the face or background.

Guard against scratching the film of the negative in placing the paper and pads in place.

Pads of blotting-paper or cloth are used to secure more perfect contact between paper and negative. They should not be too thick, nor unequal in substance.

See that the backboard fits well and is properly replaced, or the print may slip when examined, or the glass break, or the pressure be unequal, and the print, therefore, of imperfect sharpness throughout.

The paper is placed in contact with the film side of the negative; the reversal of this order, or the placing of the unsensitised side of the paper on the negative, is to be avoided.

Never force a negative into a frame ; use a larger frame, or cut a strip from the negative. The frames should be of hard and well-seasoned wood, otherwise in exposure to the weather they will warp and play havoc with glasses placed in them.

There is an art in handling negatives, frames, paper, &c. It may seem an unimportant matter how a negative is handled, but it is not really so. The hand, well-trained and experienced, may be distinguished at a glance in this one thing.

The benefit of acquiring a good style cannot be too strongly impressed upon the beginner. At first the right way is as easy as the improper ; but after a while, when habit has impressed upon the printer an awkward or slovenly method of working, it is difficult to reform it.

*Exposing the Print.*—Save in exceptional cases, the negative should not be exposed to the direct rays of the sun. The strength of light which may be used depends on the character of the negative, but ordinarily the print should be produced in the shade.

Be careful that stray rays of light, reflections, or shadows, are not cast on the negative, or unequal prints will be the result.

The picture should be darker than required in the resulting picture, as there is a loss of colour in the subsequent manipulations. Observation will guide the operator to a knowledge of the proper depth of colour required.

In examining a print, never expose it to the direct rays of light. Strictly speaking (and in the case of a beginner the rule must be made absolute), the frame should be taken into a dark room. When experience is gained, and a brief glance



once or twice during the exposure is sufficient to determine its progress, the printer may turn his back on the source of light, and look at the print in the shadow of his person.

### PRINTING VIGNETTES.

It is very important that the beginner should learn to make a good plain print before he attempts the more difficult varieties of prints.

To make a first-rate plain print—that is, one printed out to the edge of the paper—very nice art is required; but in other styles, where effects not given on the negative are produced, all the manipulative skill, with further qualities, are called into play.

*The Vignette* is difficult in proportion to the beauty of effect produced. The charm and tenderness of these pictures strike everyone on looking at a perfect specimen of this style.

Delicate gradation and perfect balance are absolutely necessary to success.

One of the greatest aids to the printer is to study the works from the best galleries, and compare each specimen with similar prints of his own production. In this way he may judge where his work falls short. The knowledge of error is a great advantage to the operator who is determined to excel, as he never relaxes his care and striving after a higher excellence.

It is impossible to give very definite instruction for printing vignettes, as the circumstances under which they are produced are never alike. A few general hints may, however, be found useful; but an artistic taste, and a true eye for proportion, are absolutely requisite.

Proportion is not so much of the background, properly

shaded off all round the head; sometimes it is *inequality to produce the effect of equality*.

In a shadow-picture this apparent anomaly is most forcibly illustrated. Here we find, generally, that the background is darker on the light side of the head, and lighter on the shaded side. An even and "perfect" vignette would, in this case, be untrue; the lighter part of the background should be extended to produce balance.

Let us try and illustrate in a few words the action of light in vignetting. For this purpose, cut a perfect oval in a piece of cardboard, and place it correctly to a negative in a frame. Now hold the negative and masked frame out at arm's length, and directly in front of you, up to the light. The image is delicately graded off into obscurity, where it is lost under the opaque portion of the mask. This is the proper position; but draw one end of the frame slightly nearer to you, so that it is not quite in front of you. Now the head appears to be thrown on one side, there being a loss of background on that side, and a gain on the other. This, then, proves that the light must be directly in front of the vignette.

The vignetter is, as we have seen, made of cardboard; it is not always a perfect oval, but is based on that form, and cut to suit the requirements of the particular negative to be printed. This is a matter calling for considerable judgment and taste. The edge of the vignetting card is cut all round with teeth and slits, to add softness to the vignetting, and the opening covered with tissue paper.

A point of importance is the distance between the vignetting card and the negative. Generally they should be quite half-an-inch apart, but the greater the distance, the smaller should be the opening.

The dark part of a background and black drapery should be more covered than the lighter portions.

After fixing a vignetting card to the frame, hold the frame and negative up to the light as described, and study the effect. A little alteration of the position may suggest an improvement which should be carried out.

As the vignette approaches the oval, so are the beauty and intention of the picture secured. The effect of halo corresponding to the outline of the figure is abominable.

Remember that the most perfect oval will not always produce the effect of one. Do not work with a pair of compasses, but use thought and taste.

*Greying the Vignette* is the darkening of the white margin to the tint of the background. This may be effected by taking the print on a sheet of glass and covering it with another clean glass. Place over the printed portion, on top of the glass, an oval card smaller than the vignette. In a subdued light expose the print, keeping the oval card in motion, and the glasses slowly revolving on the hand. The motion of the card prevents the line which would otherwise be printed, while the card protects the print, and the glasses are kept revolving, so that all parts of the background may be exposed alike.

Never let the "grey" background be darker than the original vignetted.

#### PRINTING MEDALLIONS, ETC.

Several very artistic forms of printing have attained a large measure of popular approval. Those based on the models of the work of the best line engravers are to be followed, as sure to prove satisfactory. Unfortunately, printers, in their straining after novelty, have introduced a great deal of art

of their own, of the credit of which no one would be inclined to rob them. Let the reader do all in his power, by the study of the truest art, to avoid the dangers which have proved so fatal to many.

Of the styles in vogue the most popular, perhaps, is that known as—

*The Medallion.*—Between the negative film and the sensitised paper a piece of opaque paper from which an oval has been cleanly cut out is placed. The figure on the negative is thus printed in oval form, outside which there is white paper. This is sometimes left in this state, but better effect may be gained by taking the print on a piece of glass and covering the printed portion with the oval cut from the paper, and slightly shading the white margin by exposure to light. It is well to place the oval a shade on one side, so that a fine line of the print shows; the effect of this, when shaded, is that the line of the print exposed the second time is darkened, and on the opposite side a fine line of white appears where the oval has covered the white paper and prevented its being discoloured with the rest of the margin.

The figure to be printed in oval must be carefully arranged by the artist, that the lines of the head and shoulders are well balanced and proportional, or it will be difficult to arrange.

The proper position of the oval to the figure must be maintained, or the figure will have the appearance of falling.

The oval forms commercially prepared had best be used. Great skill is required to prepare them, and home-made ovals and other forms are rarely satisfactory.

Care in the use of these papers is called for, as, when bent and torn, they are worse than useless. When out of use they should be kept in a box. Each cut-out and mask

should be marked with a corresponding number, so that there may be no difficulty in finding the right oval when it is required for shading the margin.

The ovals had best be pasted on glass plates. It is almost impossible to place them loose in position on the print, and cover both with the glass, without shifting.

*Arched Top-Forms, &c.*—Several varieties of forms in printing are in use—the oblong mask, the oblong with an arched top, and an endless variety according to taste (or, generally speaking, want of taste) of the printer. Too often these are false to art, and are not to be commended.

A good picture needs no embellishment, and the result of elaborate and ill-considered lines about the margin is to confuse and falsify the composition of the figure.

The same remark may be applied to—

*Ornamental Borders.*—A collection of zig-zags and unmeaning lines, often strongly-printed and more prominent than the figure, is in the worst possible taste.

The border should never be pronounced and clearly defined. A faint *suggestion* of a design, as of a marbled marking, or of the roughness of drawing paper, may be allowable; but it gives the idea either that the object portrayed is of sufficient interest to command attention, or that the photographer cannot rely upon his art to produce a picture.

These ornamental borders are printed from negatives taken from designs specially prepared (as, in one of the instances given, from a sheet of drawing paper, which produces the best effect for this purpose), and the form cut out pasted on. The negative and form are then used in precisely similar fashion to the clear glass and oval described earlier in the chapter.



*Cameo Pictures.*—The cameo press is used to raise the surface of the card when mounted, the centre being pressed upwards while an oval ring flattens the margin.

Vignettes to be finished in this style are printed with an oval cut-out the size of the metal oval of the press, so that all action of light is stopped at the edge of the cut-out.

For variety's sake, this margin is sometimes shaded darker than the vignetted background, in the manner described for the oval picture.

Oval pictures are also raised by pressure in the cameo press.

The effect produced by the cameo press is appreciated by some, but it is doubtful whether it does not owe the popularity it enjoys solely to the fact that it is a novel style.

#### COMBINATION PRINTING.

Printing from two or more negatives calls for the exercise of considerable taste, art-knowledge, and manipulative skill. Taste and art-knowledge are absolutely necessary, or ludicrous incongruities of effect may be perpetrated; and manipulative skill to surmount the difficulties of joining and attaining the proper depth of colour in the prints from the different negatives.

Combination printing is more generally practised in the making of compositions with natural landscape backgrounds. From an art point of view nothing can be more satisfactory than the successful carrying out of a well-intentioned picture in this way; and very great possibilities for the art have been suggested. The great advantage of combination printing is, that we may in the negative devote to each part more attention than if the whole composition were photographed in one negative. Indeed, effects impossible of attainment in any other way are produced.



If we take the simplest form, by way of illustration, a single figure, three-quarter length, to obviate the difficulties of the foreground. In the studio the lighting and pose are arranged with a clear idea of effect required in the combination print. A negative of the scene required for the background is either taken especially, or selected from one in hand.

The figure is photographed with a white background, or one very light, and from it a proof taken which may be used for the mask. This is not toned or fixed. Cut out the figure, and fix it face downwards on the portion of the landscape it should occupy in the picture.

Print the figure to the proper depth, and then lay over it the masked background negative, the mask, of course, exactly covering the printed figure. Examine before exposure, to see that no hard, dark lines of the background touch the figure, and tone down such with Indian ink, as occasion requires. If a white line forms round the figure on the second exposure, it will be necessary to scrape away the edge of the mask a trifle.

If the figure negative has a dark background, it is stopped-out with a mask formed by the background of the proof already spoken of, or by a black varnish, before being printed.

With full-length figures, the ground and foreground, with such accessories as are necessary to the composition, are taken and printed.

Groups may be made by printing one or more figure negatives, and the background afterwards added; but as the negatives are multiplied, so, of course, are the difficulties. The joins should be arranged as much as possible to come in unimportant parts of the picture.

It will be seen that, by means of combination printing, the powers of the photographer are largely increased for the production of pictorial effect, but in using it the artist must guard himself against the chance of his fancy running wild.

All the parts of the composition must be true one to the other, and all trickery avoided.

A sketch of the proposed composition should be prepared before the several negatives are made.

Pictorial background negatives, for printing in combination with portraits, are so well-known that they need no description. In great part they form a pleasant accessory to a portrait; but in their use a great deal of discrimination is requisite, absurd combinations being often made with them.

The floor of the figure negative should always be used where a full-length is taken; the background light. The directions already given hold good with these backgrounds.

Perpendicular lines in the background should be adjusted perfectly, or a tumble-down effect will be produced.

Generally, in all light portions of the figure, the mask should most accurately cover the print; but in dark drapery and shadow the mask may be cut a trifle inside.

The frames should always, in printing the background, directly face the light, and be, to secure a softer effect at the joins, kept constantly in motion by being turned round.

## CHAPTER XI.

### TONING PRINTS.

It is still an open question whether the prints had best be toned with the rough edges as they come from the frames, or first cut. It is not a matter of supreme importance; the best reason in favour of the cutting before toning being that the edges may be preserved, and the silver extracted. Against, is urged the objection that the edges get worn in washing and toning. We can only say we have not found it so; indeed, find that the rough edges are liable to tear.

*Cutting the Prints* is an operation calling for considerable skill and taste.

The position of the figure on the print has a wonderful effect on its appearance. If the print is cut down too near the head the effect is to heighten the figure; too much space above the head dwarfs the figure. With cuts at the side, where the space behind the figure is reduced, the figure has the appearance of backing out of the picture; too great space behind and too little in front, suggest walking out of the picture.

These, with the want of regard to the perpendicular of the figure, roughly comprise the chief errors in cutting the print.

Many other nicer points arise in individual practice, into which lack of space will not allow us to enter.

The print is placed face upwards on a thick glass, and over it is placed a bevelled glass cut to the size of the picture required. These glasses are to be obtained at all the stock houses. Care must be exercised that the glass occupies its proper position on the print, and with a sharp knife the edges are cut off. There will be experienced some difficulty at first in making a clean, straight cut, but with careful practice this will be surmounted. The knife will be found easier to use than scissors. Improper cutting rapidly blunts the knife and scissors.

Hold the glass firmly to prevent the print slipping, and avoid tearing the edges of the paper, or wearing the edge of the knife against the glass.

Proceed carefully, slowly if necessary at first, and always. There is no gain of time in cutting a batch of prints quickly and badly; the slowest time on record, if the work be well done, is quicker.

The prints should be now subjected to thorough *washing* until all the soluble silver is eliminated. This holds good only with the acetate bath, as with others a small amount of free silver should be left in the print, the washing not being so thorough.

In a dish of clean water the prints are immersed, face downwards, one by one. It is necessary that each print be evenly and thoroughly wetted, or stains will result. They are placed in face downwards to prevent the silver chloride or carbonate which may be formed by the soluble chlorides or carbonates in the water from being precipitated on the surface of the print. In toning, the gold is precipitated on

these deposits, and the fixing bath of sodium hyposulphite dissolves them away, leaving untuned spots.

The water in which the prints are washed should be changed five or six times, until there is no appearance of milkiness, if the toning bath used be the acetate.

The first washing of the prints may be continued two or three minutes, and the water preserved, as it is rich in silver. It is placed in a tub, and the silver precipitated with common salt each evening, the clear water being decanted and thrown away in the morning.

*Acidifying the Prints.*—Some printers make the final wash in water slightly acidified with acetic acid, with the idea that the prints tone better; but there is really no warrant for the assumption. Free acid in the print may, with reasonable grounds, be suspected as the cause in great part of their want of permanency. A redness is given the print, which, it is said, is an aid in determining the colour in toning. This redness may be given by the immersion of the print in water containing a faint trace of common salt; but it is best to wash only in plain water.

#### THE TONING ROOM.

In this chamber several important operations are conducted. The washing, toning, fixing, and the final washing, &c.

In these operations are employed agents antagonistic to each other, and the greatest circumspection in their use must be enjoined; failure surely resulting on any want of care.

The sodium hyposulphite used in the fixing bath is the deadly enemy to the toning bath; and if the unfixed prints are touched by any trace of the hyposulphite, ineradicable stains will be formed. At any time other than when used



for fixing the prints, the hyposulphite has a mischievous effect. There is, however, no reason for fixing prints in another room, because, without care, the danger would scarcely be lessened.

The fixing bath must be kept apart, and the operator should never place his hands in it and proceed to other duties before washing off the hyposulphite.

Splashes of sodium hyposulphite ought to be guarded against, as the fine powder left after evaporation of the water may be carried about the apartment, and contaminate washing waters or baths.

On a table near the window, shaded to secure diffusion of the light, is placed the toning bath, and by it the dish containing the washed prints.

Diffused light is better than yellow light, as the tones of the prints may be more accurately judged. It is not, however, always possible to secure daylight, as the toning is necessarily delayed to a late hour.

A large sink is fixed at one end of the room, in which stand the washing-dishes. A good supply of water should be obtainable, to secure the perfect elimination of the fixing solution from the prints, &c.

The perfect washing of the prints after fixing is a point of such great importance that washing machines have been invented, which are supposed to remove every trace of the hyposulphite from the print; yet pictures *will* fade. An ordinary porcelain dish, with a continuous supply of water, and a syphon to draw off the water so as to constantly change it, will answer every purpose. Wooden vessels are ill adapted to the purpose, as the hyposulphite contaminates them.



It is, however, very necessary that some means be taken to give the prints a thorough washing, and without a good supply of water this cannot be done.

The general arrangement of the room must depend greatly on the accommodation at the command of the printer; nor is it a matter of importance so long as the considerations we have laid before the reader are regarded.

### THE TONING BATH.

The object of toning is to give the print a more agreeable tint than that which would result from its being placed in the fixing bath directly after printing.

For this purpose a great variety of preparations of gold chloride are used.

One of the most reliable and satisfactory under varying conditions is that prepared with sodium acetate.

The gold is first dissolved in water, one ounce to each grain of the gold, and kept as a stock solution.

The bath is made up as follows:—

Sodium acetate	...	...	...	75 grains
Gold chloride	...	...	...	3 „
Water	...	...	...	30 ounces

This bath owes its value, beyond the beauty of results obtainable by it, to its simplicity, uniformity, and reliableness.

When first prepared it is not at its best, but after a few days it will be thoroughly satisfactory, and improve with age if replenished from the stock solutions directly it shows signs of failing.

By keeping the gold and the acetate in solution, the bath may be constantly replenished as required. These additions

should always be made in the morning of the day it is required for use.

The practice of adding gold to the bath directly before using is productive of much mischief, and cannot be too strongly reprobated. The bath should, every night after having been used, be returned into a wide-mouthed bottle, and in the morning decanted, and the gold solution added.

The prints should be thoroughly washed before toning, and this done, the toning will be found to proceed very evenly.

*The Carbonate of Soda Toning Bath* is one very much used. The prints are somewhat bleached by it, so that the depth of printing should be deeper than when using the acetate bath. Prepare as follows :—

Sodium carbonate ...	...	...	45 grains
Gold chloride ...	...	...	3 „
Water ...	...	...	30 ounces

making up a fresh solution each time about an hour before it is required for use.

This bath requires considerable experience to use successfully, as the prints show a variety of tints before that required is arrived at. Watch the half-tones until they assume a purplish shade, and then stop the action.

*The Chloride of Lime Bath*, which is suitable for white and black pictures, but is extremely variable, is made as under :—

Chloride of lime ...	...	...	4 grains
Gold chloride ...	...	...	3 „
Water ...	...	...	30 ounces

with a table-spoonful of chalk to neutralise acidity.

It may be used directly if it is made with hot water; if

with cold, a few hours should elapse between mixing and using it.

Many other formulæ might be quoted, but as by the first two almost every class of work may be done, further methods appear likely only to divert the attention.

*The Citric Acid Bath* has found favour with many, but there is every reason to believe that, whatever of permanency in the photograph is to be attained, it will be found in the alkaline methods of toning and fixing.

#### TONING, WASHING, FIXING, ETC.

The prints have been thoroughly washed to remove all the free silver, and the dish containing them is placed beside the toning bath.

*Toning*.—Care must be exercised in placing the prints in the bath. No trace of the toning solution must touch the prints before they are placed in the bath, or spots would be formed.

With the right hand take the prints from the washing-dish, and drop them one by one on the toning solution, and with the left hand submerge them. Each print must be thoroughly and evenly wetted with the solution, or unequal toning will be the result.

When in the bath the prints should be kept in motion to prevent them sticking together.

A great number of prints should not be toned at one time, even by the experienced printer, as an amount of care should be bestowed on each print which cannot be given when a lot of prints are in the bath. Then the most that can be done is to get an even toning throughout, without regard to the requirements of the individual print.

Very often successful toning is looked upon as getting a hundred or so of prints one tone of brown or purple; but this can scarcely be admitted as the perfection of toning. Regard to the character of the subject is necessary, and though we cannot expect to represent nature, something of suggestion may be made.

The different tones are obtained by the length of time the print remains in the bath.

Red comes first in the scale; chocolate, by toning a little longer; and a rich dark brown by a trifling continuation of the action of the bath. The purple tone is attained by removing the print from the bath directly it shows the required tint.

If the print is removed just at the moment the necessary tone is reached, the continuing action of the solution in the print will carry it a trifle further, which will compensate for the bleaching quality of the fixing bath.

Hard, intense prints should be subjected to vigorous toning, and be placed face downwards in the solution.

Weak prints require gentle toning.

The effect of toning face downwards is to quicken the operation; face upwards, to retard.

These remarks apply especially to the baths prepared by the first two formulæ.

The prints, as they are removed from the toning bath, are placed in a dish of clean water, in which a little salt has been dissolved, until all are finished. The bath should then be poured back into the bottle; and the prints placed in—

*The Fixing Bath.*

Sodium hyposulphite	...	...	5 ounces
Water	...	...	30 „
Liquor ammoniæ	...	...	2 drachms

Each print must be evenly wetted with the solution in every part without delay, or stains are acquired. The hand by which the prints are taken from the water must have no trace of hyposulphite upon it, or the prints will be stained. From the water take each print separately, in one hand, and drop the print upon the surface of the fixing bath, and with the other hand instantly submerge it. Keep the solution in constant motion.

From ten to fifteen minutes is sufficient generally, but by holding the prints up to the light it can easily be seen if the whites are pure. A mottled, dirty yellow appearance indicates insufficient fixing.

If blistering occurs in the prints after fixing, instead of taking the prints from the bath, and directly placing them in pure water, gradually dilute the bath, with the prints in it, until nearly all the hyposulphite is absent; then transfer the prints to the washing-dish. Prints do not, however, necessarily blister on the immediate transition from hyposulphite to water. Salt in the washing water also remedies the evil.

In winter the water used for making the bath should be lukewarm.

*Washing the Prints* must be done in the most thorough manner. There can be no doubt that the *time* of washing is, in importance, quite secondary to the perfectness of the changes. A running stream with a syphon arrangement, whereby the water of the reservoir in which the prints are held may be perpetually changed, is the only means of thoroughly eliminating the hyposulphite.



## CHAPTER XII.

### FINISHING THE PRINTS.

THE importance of an apartment set aside to the purposes of a

*General Work Room* cannot be too highly estimated. So much of the beauty of the picture depends on the care and skill in the mounting of the print, that it were well if more watchfulness were bestowed on it than is usual. Who has not seen the dreadful effects of negligence and want of dexterity? In fact, the rule of-thumb in too great degree characterises this branch.

Too often the work of mounting is carried on in the reception-room during business hours, where the prosperity of the gallery might well warrent an arrangement more conducive both to the perfectness of the mounting and the attention to customers. We have no desire to raise issues as to the conduct of business, or to appear in the *role* of the reformer; but so far as the perfection in the manipulations of which we are treating, we feel justified in speaking.

In the general work room, too, account should be kept of the prints supplied to each order, and general supervision kept over the printers in the discharge of the directions given them.



A check of some kind is necessary to prevent mistakes, especially in the large establishment we are supposing; although few businesses are so large that all the departments would command separation as here given, yet, modified to suit the most humble gallery, we have not mentioned one precaution it would be safe to disregard, if perfection is desired.

*Mounting the Prints.*—Cause of fading is laid at the door of the mounting materials used, and the complaint, in some cases, is not without reason. Any acidity will surely cause spots and fading, but if the common mounting agents are used in a fresh state, there is no cause for suspicion. Of all the substances in use, none are better than starch. The only way to prepare it is to dissolve the starch to a stiff paste with *cold* water, in a suitable basin; pour boiling water over it, stirring well all the time, until, after it has thinned, it has again stiffened. It is now thinned with hot water to the required consistency. These directions must be rigidly followed.

Gum-arabic is also an excellent mounting material. Take the best quality, and dissolve in hot water; the thick mass is placed in muslin, the ends of which are gathered up to form a bag, and the gum squeezed through by pressure from the fingers.

The prints of one size are placed in a heap, face downwards, on a level board. The most suitable condition for mounting is while they are still slightly damp, not wet, at which time they are more manageable than when dry and curled up.

Paste over the back of the top print of the heap evenly, remove any hairs or lumps, and place in position on the card.

Rub into contact with the hand, a sheet of clean writing paper being placed between the hand and print, and rub down more securely with a smooth, hard substance. The bottom of a bottle serves better than anything. Slightly bend the card back to counteract the contraction of the face in drying.

“*Spotting.*”—Accidental blemishes, as white spots from dust on the negative, &c., are covered over by the application of colour mixed with gum. In some galleries a great amount of work is caused by faulty retouching, and by carelessness in printing. All the failures with which we have to do are preventable

*Burnishing.*—The prints are now rolled in a press. In this operation it is necessary that care be exercised not to stop rolling while a print is in the machine, or a line will be marked on the card.

Good usage will preserve the burnisher for years, and save the prints from many a scratch and hole.

Guard against dust settling on the print before rolling, and keep the burnisher clean. When out of use, it should be covered.

*Encaustic Paste* for waxing prints may be made by dissolving white wax by heat, and adding three-fourths the bulk of spirits of turpentine. Place the wax in a china or glass bowl, in a vessel containing boiling water, and dissolve the wax. Gradually add the turpentine to the melted wax, stirring well all the time. Add enough of an essence—say, of cloves—to destroy the smell of the turpentine. This is lightly rubbed over the print, the card being protected by a mask.

## CHAPTER XIII.

### DURABLE SENSITISED PAPER.

IN uncertain weather it is of importance that paper may be prepared without the danger of its spoiling if not at once used.

The best method, because it does not necessitate any change in the bath, is to place the sensitised paper in a blotting-pad which has been thoroughly saturated in a thirty-grain solution of sodium carbonate in water, and dried. The sheets may be kept in the pad, under pressure, until they are required for use. Fume the paper before using.

*Washed Paper.*—By washing away a portion of the free nitrate from the paper, we have an easy and sure method of getting good keeping qualities without sacrificing uniformity of results or sensitiveness.

When the paper has been sensitised in the ordinary manner, it is drawn, face downwards, through three changes of water. The paper should not, in any instance, be allowed to rest on the baths of water, or the print will lack richness and depth. Dry; and when required for use, fume for fifteen or twenty minutes.

*Citric Acid as a Preservative.*—The use of a bath made up with the silver nitrate acidified with citric acid has been recommended; and, with the exception of a slight loss of sensitiveness, the results are very satisfactory.

The bath is prepared as follows :—

Silver nitrate	...	...	...	40 grains
Citric acid	...	...	...	20 ,,
Water (distilled)	...	...	...	1 ounce

Float the paper a rather longer time than with the alkaline bath, and dry the paper thoroughly.

The paper is then put away between sheets of clean blotting-paper, in a dry, dark place.

As it is required for use, fume double the ordinary time. If the paper shows tendency to discolour in fuming, add to the ammonia in the dish a little chloride of lime.

Before toning prints on paper sensitised in this way, immerse in water containing a slight trace of ammonia, after washing in the ordinary way. The toning-bath should be decidedly alkaline.

## CHAPTER XIV.

### IMPERFECTIONS IN THE PRINT.

*Failures in Preparing the Paper.*—It is not always easy to trace the cause of a defect appearing in the print. Many defects may, from the evidence of appearance, be attributable to several of the manipulations. It is therefore necessary, when endeavouring to eradicate a fault, to carefully trace it to its origin.

For the reason of the similarity in appearance of certain defects common to failure in several manipulations, it is of importance that the reader, in consulting the appended list, should remember that every defect is only set down as possibly caused in the manipulation under which it is placed, but that, as further study would show, it may be caused in other ways.

*Defects in Albumenised Paper.*—A perusal of the notes on albumenised paper will show that the commercially-prepared paper may be at fault. This, however, is not so often the case as workers perplexed with spots, streaks, stains, and other troubles would like to believe. As often as not, the fault is in the after-manipulation.

The defects of paper are generally to be seen on examination before sensitising.

The principal fault of albumenised paper is in the inequality of the surface. This may be readily traced by observing the effect on different portions of one sheet under one negative. Those from the thick end will give fine, rich prints, while those from the thinner end are poor and lustreless.

Spots and streaks of albumen are caused by carelessness of the albumeniser, the spots being splashes on the sheet, and the streaks from little rills running down the paper when drying.

Metallic spots are particles of rust settled on the paper when drying; sometimes after albumenising, but more often after sensitising.

Dry and horny paper should be kept in a cool, damp place for some hours before it is sensitised.

“Tear drops” are often caused by this toughness of the paper. All spots of silver solution on the paper should be blotted off with clean bibulous paper before the sheet is dried. It is well to draw each sheet over a glass rod fixed at one end of the sensitising-dish when the paper is taken from the bath.

*Defects in the Bath.*—A too strong bath causes bronzing of the shadows; a weak bath, poorness of the print.

Scum, which causes a greyish stain to the paper, should be removed from the surface of the solution before the sheet of paper is laid on. Take two or three folds of blotting-paper, and skim the scum from the surface.

Discolouration of the paper may be from the disordered state of the solution.



A too alkaline bath causes an in-sunken appearance of the prints. An impoverished bath produces pictures poor, weak, and flat.

Red spots, and red prints, are often due to the same cause.

The bath turns brown. Treat, as already described, with potassium permanganate, or kaolin. It is very probable the solution is weak; clear, filter, and strengthen.

*Failures in Sensitising the Paper.*—White spots on the paper are caused by bubbles of air allowed to remain under the paper while on the bath. The sheet should be examined as soon as fairly floated.

Tear drops, or small drops of silver solution adhering to the sheet as it hangs to dry, should be blotted off with clean blotting-paper. The paper was too dry.

The paper repels the silver solution for the same cause of dryness.

Rapid discolouration of the paper is often caused by over-sensitising.

Dullness of the prints, and an in-sunken appearance of the image, may, too, be caused by over-sensitising.

Bronzing of the shadows also comes of too extended floating of the paper.

Poor, weak prints are the effect of too short sensitising.

Disagreeable red tone of the prints may be caused by insufficient floating.

“Greasiness” of the paper is also attributable to the short sensitising of the sheet, or from extreme coldness of the solution.

Curling back of the sheet on the bath is due to the toughness of the albumen coating. Breathe on the back of the paper until it resumes its place on the solution.

Inequality of prints is sometimes the effect of unequal sensitising.

Stains on the paper after silvering are sure to appear if the damp sheet is brushed against an unclean substance.

Dark stains on the back of the paper are from silver solution which has run over the paper.

*Failures in Drying the Paper.*—To counteract the tendency to curl, weight the paper down as already described.

Tear drops should be blotted off with clean blotting-paper.

Stains arise from the sheets coming into contact, and sticking together.

Imperfect and unequal drying causes many defects in the print.

When the paper is left damp there is danger of its sticking to the negative.

*Failures in Fuming.*—Over-fuming is the cause of blue, cold prints. Sometimes a metallic appearance is given to the picture.

Insufficient fuming causes the paper to print poorly. Red, weak prints will result. The fault may be either from using insufficient ammonia, or withdrawing the paper from the fumes too soon.

Unequal fuming,—unequal prints.

*Failures in Cutting Paper.*—Stains come from the fingers improperly placed on the sensitised surface of the paper.

Dirty paper, from placing the sheet on an unclean table.

Careless and thoughtless cutting results in waste of paper. This may be either from cutting up the paper into pieces too small for the pictures, or with an unnecessarily large margin. Practise on a sheet of ordinary paper of the size of the sensitised sheet, or arrange by measurement.

## CHAPTER XV.

### FAILURES IN PRINTING, TONING, ETC.

THE negative, unless carefully handled, is in constant danger of being broken. If unprotected by a glass bed, changes of temperature will break it. Warped frames, and pads too thick or unequal, will surely crack it. Flaws, ragged cutting, and curvature of the negative glass are also a source of danger.

White spots on the prints are caused by dust between the paper and film. Brush the negative before laying on the paper.

Double outlines come of carelessness in opening and shutting the frame during the progress of the printing.

Weak lights in the print, from too frequent examination in strong light.

Blurring, from unequal pressure. Perhaps the paper was too large for the frame, or the pads uneven.

Unequal sharpness is caused by not placing the backboard of the frame in its place, or from inequality of the pads.

Unevenly printed shadows are often caused by printing a negative much retouched in the shadows in too strong light.

Harsh vignetting is a fault resulting from unskilful cutting of the mask, or in placing it too near the glass.

Vignettes of bad shape, from ill-shaped forms, or from light creeping in at the sides.

Badly-shaped medallions caused by using unshapely forms, or those which have lost sharpness by bad usage.

Failure in "greying" the vignette is generally caused by too strong light, or want of skill in manipulation. The printed-in background should *never* be darker than that of the vignetted print.

Printed-in backgrounds must be used with circumspection. Inappropriateness; too great sharpness; strong lines touching the figure; lines destroying the composition; bad joining; printing over the figure; white marks round the masked portion of the print; moving the background out of position—are a few of the dangers in manipulation which call for artistic taste and knowledge, and the exercise of the greatest care and skill.

Inartistic fancy-printing, from want of taste or skill. Keep to plain work.

Finger stains on the print. Avoid touching the sensitised surface.

*Failures in Washing the Prints before Toning.*—Stains from splashes in placing the prints in the washing-dish, or unequal wetting.

Imperfect washing. Too short time of immersion, or from the prints sticking together in the water.

*Failures in Toning.*—A bath containing too much gold will act so rapidly that there is not sufficient time to examine the progress of the toning. Unevenness of tones comes of this fault. Weakness of tone is also sometimes attributable to this condition of the bath; but may arise from the original lack of vigour in the prints.

A solution with but little gold delays or altogether stops the operation.

Uneven toning may be caused by the prints sticking together in the solution; or from adding gold during the time the prints are in the bath.

Inartistic toning is the result of want of taste. Generally known as "mechanical" toning, this fault shows itself in the prints being all toned to one colour, regardless of artistic propriety. The operator may have the greatest manipulative skill, but no taste.

Prints refuse to tone when the bath is contaminated; too weak in gold; or, from being too cold.

*Failures in Fixing.*—Stains and streaks are formed in the prints if unequally immersed in the solution.

Finger marks appear when touched by hyposulphite-stained hands.

Splashes in placing the prints in the solution are to be avoided.

Yellow spots are caused by imperfect fixation.

Prints turn yellow when fixed in a worn-out bath; and when there is free acid in the solution.

Cloudiness is the sign that the prints are imperfectly fixed.

"Blisters" may be avoided by using an alkaline fixing-bath. The solution should not be cold.

*Failures in Washing after Fixing.*—Insufficient washing is the cause of fading. After a short time the prints will turn yellow.

Prints should not be allowed to stick together.

If bubbles form in washing, they should be broken up by agitation of the water.

Dishes used for the sodium hyposulphite should not be used for washing.

*Failures in Mounting and Finishing.*—Yellow spots are often caused by using old blotting pads in which there are traces of sodium hyposulphite. Spots sometimes come from using mounts in which are sulphur or soda.

Stains appear when the mounting material used is sour.

Spots and stains are also caused by having damp mounted pictures in long contact.

In cutting the prints the position of the figure on the print is to be regarded. Too great margin at the top dwarfs the figure; too little lengthens it. A proper proportion in front and behind the figure should be left. (*See remarks on Cutting the Print*).

Ridges in burnishing the print are the result of want of care. The rollers should be kept perfectly clean to prevent scratching the print. Too much pressure ought not to be used, or the edges of the card will be injured.

Spotting the print requires skill and care, as the appearance of the pictures may be easily marred.



## CHAPTER XVI.

### PRINTING ON PLAIN PAPER.

THE high gloss secured in prints on albumenised paper is generally preferred; but many persons of artistic culture condemn the smoothness and polish as vulgar, and false to art. There is, undoubtedly, a charm about a well-finished albumen picture, although we may feel certain that it does not possess qualities which can long hold our sympathies.

Prints on plain paper are free from this fault of highly glazed surface, and it is almost matter for surprise that the use of plain paper should be kept almost exclusively for large prints, intended to be finished in chalk, Indian ink, &c.

*Salting the Paper.*—It is usual to select the side of the paper having the finer grain, but in some cases the rougher is more suitable to the work. Mark the paper at the back, for guidance in after-operations.

Float, for fifteen seconds, on a bath prepared as follows:—

Ammonium chloride	...	...	250 grains
Gelatine	...	...	15 ,,
Water	...	...	30 ounces

Dissolve the gelatine in hot water, and add the chloride. Filter.

Each time after using this bath it should be filtered.

Dry the salted paper in a warm room, and guard against dust settling on the damp surface.

*Sensitising* plain paper is performed in precisely the same manner as described for albumenised paper, and might be done on the same bath, but for the fact that the plain paper rapidly discolours the solution.

The bath, composed of—

Silver nitrate	...	...	...	40 grains
Water	...	...	...	1 ounce

will give very good results.

The ammonio-nitrate bath is, however, the best adapted to plain paper. Prepare a solution of silver nitrate, 40-grains strong, in pure water. Add liquor ammoniæ until the precipitate which forms is *nearly re-dissolved*. Filter. When this bath is used, it is well to reduce the quantity of chloride in the salting solution.

*Fuming* the paper is recommended, but with the use of the ammonio-nitrate bath the time of fuming may be reduced one-half.

*Toning, &c.*—Plain prints, especially large ones, require special care in washing, and will not bear too long soaking, or the paper becomes tender. It is best to tone the plain prints by themselves first, and carefully watch the process. Cold tones are required where the prints are prepared for artistic work.

*Mounting.*—The prints are mounted on stout cardboard; if a matt is to cover it, the edges of the print need no trimming.

Plain prints should on no account be burnished.

*General Remarks.*—Plain paper requires very careful treatment in all stages of the manipulations. The face of the print should never be touched, and in handling by the edges it should be gently lifted. Under rough usage the paper is sure to tear.

In washing, the running water should not be allowed to fall on the print, or the paper will crease and break; and every precaution must be exercised that the flow of water is not strong enough to crumple up the sheet.

The secret of success in printing on plain paper is to secure harmony between the salting and sensitising baths. That secured, bold and brilliant prints will be obtained. Improper treatment in the several manipulations produces defects enumerated in the chapters on imperfections in the print.

## CHAPTER XVII.

### PRINTING ON PORCELAIN.

OF all the photographic printing processes, none can rival in charm and beauty the effects obtainable on porcelain plates.

Detrimental to the popularity of these pictures has been the uncertainty in their production, and the early fading of the prints, when made with the Collodio-Chloride Process.

From practical test, the following formula is recommended for obtaining, with uniform success, superior porcelain pictures, possessing strength, beauty of tone, and permanency.

*Albumenising the Plate.*—Dissolve three grains of strontium chloride in four drachms of water, and add the white of one egg, beaten to a stiff froth; let it settle, and filter through sponge.

Clean the porcelain plate by placing it in acid for several hours; wash thoroughly, and, when dry, wipe with flannel dipped in alcohol, and rub dry with clean flannel. Remove particles of dust with a camel's hair brush, and pour on the albumen cold, drying it over heat. Plates thus prepared can be kept any length of time, and are ready for use at any moment.

*Sensitising the Plate.*—Dissolve one ounce of silver in twelve drachms of water, by grinding the silver in a glass mortar and adding the water.

Take of this four drachms into a clean graduated measure or wide-mouthed bottle, and add thereto, by drops, liquor ammoniæ, which will brown the solution; continue adding until it is clear. Add this to the other eight drachms of plain silver; this will brown all the solution; add by drops pure nitric acid, until it is clear, then add the twelve drachms of silver thus treated to twelve ounces 95 per cent. alcohol, stirring while adding; filter, and it is ready for use.

This solution will keep for any length of time, and when it requires replenishing, make new, and mix with old; filter, and it is ready for use.

When wanted for use, filter, and pour into a clean sensitising dish. Warm the plate and tip it into the bath, allowing it to remain therein two minutes for polished plates, and three minutes for those with a ground surface; remove from the bath and let it drain, then flow with 95 per cent. alcohol, pouring on the corner sufficient to cover the plate. A repetition of this upon a different corner of the plate may be required before it presents an even surface.

When the plate is drained, and dried by heat, it is fumed from five to ten minutes. Should a vapour appear after fuming, gently heat the plate, and it will disappear. Print a shade deeper than for prints on paper.

*Toning the Print.*—When printed, place the plate in acid water, in proportion of half an ounce of acetic acid to sixteen ounces of water; let it remain therein for several minutes, or until the picture is changed to a uniform red tint; then

wash in several changes of water, or under a tap, and tone in a solution prepared the same as for paper prints.

Examine the progress of the toning by transmitted light; care being taken not to over-tone the print.

*Fixing*.—When toned, wash, and place in the fixing solution—

Sodium hyposulphite	...	...	1 ounce
Water	...	...	10 ounces

Fix from five to ten minutes, then wash under a running stream from ten to fifteen minutes; dry with gentle heat.

For plain prints, or those to be tinted, plates with a polished surface are used; for fine artistic finish in colours, plates with a ground surface produce the desired results.

Photographic prints upon watch-dials can be made in the same manner. A few specimens made by this process, displayed in handsome velvet cases or frames, will result profitably to any establishment.



## CHAPTER XVIII.

### ENAMELLING OR "GLACE FINISH."

To impart a high state of gloss to the paper print, a film of gelatine is laid on the surface, and the picture and film afterwards subjected to pressure in an embossing cameo press.

In the press, by means of forms, in polished metal, of various shapes, different designs in relief can be secured to suit the requirements of the print or the taste of the operator.

*The materials required* are French gelatine, plate glasses, backing papers, collodion, scraper, and cameo press.

*Preparing the Plate.*—For success in the operation of enamelling it will be found necessary to use only the best polished plate glass, as every defect of the glass will be marked on the surface of the gelatine. It should also be of sufficient strength to bear the pressure put upon it in the mounting of the prints.

Clean most thoroughly, and apply an edging of albumen or gum-arabic.

The plate is now coated with collodion :—

Ether	...	...	...	...	10 ounces
Alcohol	...	...	...	...	10 ,,
Pyroxyline	...	...	...	...	120 grains
Castor oil	...	...	...	...	10 drops

The more fluid the state of the collodion, the better.

Prepare the plate one hour before it is required for use, so that the film may be thoroughly dried.

*Preparation of the Gelatine.*—Melt one ounce of gelatine in eight ounces of water, in a stone or porcelain-lined vessel, by placing it in a pan containing hot water. When melted, strain the liquid through linen into a porcelain dish, this dish being placed in a larger one, containing hot water, to keep the gelatine lukewarm and in a liquid state.

The prints are placed in the gelatine and allowed to soak.

#### MANIPULATIONS.

First: See that the surface of the glass is fine and uninjured, and perfectly clean.

Second: Edge the plate, about one-eighth of an inch all round, with albumen or gum-arabic.

Third: Coat the plate with collodion on the prepared side, and dry for one hour before affixing the print.

Fourth: Before placing on it the print, warm the glass to blood heat, to drive off any dampness that may be in the film.

Fifth: Place the prints in the gelatine, face upwards, for five minutes.

Sixth: Take the prints one by one from the gelatine, and place them face downwards on the collodion film. With a piece of glass, the edge nicely rounded, or a roller, press out the surplus gelatine, not too forcibly, and with a damp sponge wash over the back of the print.

The pressure should not be too great, as the object of it is only to procure a smooth surface of the gelatine, and to drive out bubbles. This operation must be conducted with



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expedition and precision, before the gelatine has begun to set.

Stand the plate on end for ten minutes, or until all the prints have undergone the same operation.

The glass scraper, or the roller, should be placed in a vessel of hot water when not in use, to keep the instrument free of gelatine.

Seventh : By a similar operation to that just described, Bristol board cards are fixed to the print. Cut the cards a trifle smaller than the print, and soften in hot water. Dip in the gelatine, and apply to the back of the print. Press down as in the last operation, and dry.

Eighth : The enamelling being finished, stand them up, face side towards the wall, and each separate; allow them to remain overnight; then take a knife and rule, and cut inside the gum and through the collodion, and a beautiful glacé photograph will peel off from the glass.

Two cabinets can be mounted on an 8 by 10 glass, and two cards on a  $5\frac{1}{4}$  by  $7\frac{1}{4}$  glass.

*For mounting*, put the picture in the press and emboss it. To prevent the convex surface from flattening in a short time, emboss a ferrotype plate of the same size, and cut out the raised part and place it between the picture and the card for mounting, to keep the raised cameo in place.

Instead of using a glass pattern for cutting the pictures to the desired sizes, it is best to have a thick paper or wood form, with the shape of the medallion cut out. This has two advantages : first, it prevents the surface of the picture from being scratched; second, it ensures an equal and correct margin around the medallion; they can also be used for

pressing the pictures to the mount, as it leaves no mark on the enamel.

Mount the picture by applying a little gelatine or mucilage on the back, say a quarter inch from the edge ; place on the mount, then place the die on the picture, and put under a weight for several hours. This completes the picture, and with these practical instructions followed, nice work will be the sure reward.

By making the gelatine nearly hot when putting on the backing, the same solution answers for this operation. Always strain the gelatine before using.



## CHAPTER XIX.

### DEVELOPED PRINTS.

AT times of the year when it is impossible either to obtain large negatives direct from the object, or prints by contact in the usual manner, the processes for obtaining prints by development are serviceable.

The image on the paper may be produced by the brief action of light through a negative in contact with the paper, or by projection through the negative on to the surface of the paper in the same way that a picture is thrown on a screen by the magic lantern. For this, light of the sun or artificial illumination may be used.

*The Salting Solution* is prepared as follows:—

Potassium iodide ...	...	...	10 grains
Potassium chloride	...	...	40 „
Tapioca ...	...	...	20 „
Lemon-juice	...	...	16 minims
Distilled water	...	...	2 ounces

Dissolve the salts in the water, add the lemon-juice, and boil. Mix the tapioca with a little cold water, and add to the hot solution, stirring the while. The mixture should be clear and free from lumps.

Brush the solution lightly over the plain paper, taking care not to rub up the surface.

Hang the paper up to dry. Sometimes light stains show on the paper, but these disappear in the sensitising.

The paper having been thoroughly dried, is ready for sensitising.

*The Sensitising Solution.*

Silver nitrate	...	...	...	40 grains
Citric acid	...	...	...	3 „
Water	...	...	...	1 ounce

Float the paper two minutes, and dry by gentle heat in a warm, dark room.

*The Negative* for enlargement should be full of detail, thin, and with a fine deposit of silver.

Do not varnish the film; but should retouching be required, a dilute solution of gum-arabic will give a good grain for the pencil. The advantages of the gum water are that it does not colour the film, as many varnishes do; it is free from ridges; and is perfectly even.

The rubbing down of a varnish film to form a retouching surface produces an uneven thickness, and a difference in surface structure of the film, which causes unequal illumination. This is a serious defect in the magnified print.

*The Exposure* of the print is not carried beyond the faint appearance of outline of the image.

*Development.*—Prepare a saturated solution of gallic acid, and mix one part of this with four parts of distilled water. On this float the print, face downwards. The progress of development may be watched by lifting corners of the print now and then. The image develops to a deep brown colour.

Wash in several changes of water for a few minutes. Tone with gold, and fix in an alkaline solution of sodium

hyposulphite. Wash thoroughly, to remove the fixing solution.

#### ANOTHER PROCESS.

The plain paper is immersed for two hours in a *salting solution* made as under :—

Sodium chloride	...	...	...	100 grains
Hydrochloric acid	...	...	...	6 minims
Distilled water	...	...	...	10 ounces

Dry thoroughly. Float for two minutes on the following solution :—

#### *Sensitising Solution.*

Silver nitrate	...	...	...	40 grains
Citric acid	...	...	...	1 grain
Distilled water	...	...	...	1 ounce

Dry ; observing the same precautions as in the case of the ordinary albumenised sheets.

Expose under the negative or in the camera until a faint image appears.

In a dull light twenty to thirty seconds will ordinarily suffice.

*Development.*—Take the print on a sheet of glass, and pour over it sufficient to evenly cover the paper, of the following solution :—

Pyrogallie acid	...	...	...	2 grains
Citric acid	...	...	...	1 grain
Water	...	...	...	1 ounce

Some skill is necessary to cover the paper without stoppage of the flow of solution over the print. The action of the developer is almost as rapid as that for the collodion

negative, and any cessation of the action produces lines on the print.

As soon as the image has acquired the necessary strength, the print is washed under the tap to stop the action of the developer.

Wash thoroughly, and tone. Fix in sodium hyposulphite—one ounce dissolved in ten ounces of water.

Wash with the thoroughness enjoined in ordinary printing.

#### PROCESS WITH ALBUMENISED PAPER.

For this the Saxe paper is recommended.

*Sensitise* on a forty-grain silver nitrate bath acidified with thirty grains of acetic acid.

*Development* is conducted with one part of a saturated solution of gallic acid in four parts of water. Wash thoroughly.

Tone, fix, and wash as usual, thoroughly.

Prints produced by this process cannot compare with those of full exposure by contact under a good negative, but serve well as a foundation for the work of the artist.

Finishing in Indian ink, chalk, colours, &c., the albumenised surface needs to be abraded. To accomplish this, finely powdered pumice-stone may be rubbed over with an artists' leather blender.

## CHAPTER XX.

### PRECEPTS FOR PRINTERS.

CAREFULNESS and precision may be accounted the qualities most useful to photographers.

Quickness should never be allowed to take the mean position of a synonym for slovenliness and carelessness. The deftness which comes of experience is power, never incertitude. There is nothing haphazard in the rapid work of the master; but the pupil must not attempt to copy the later manner of his master until he has surmounted the early difficulties. There is no shirking responsibilities, nor jumping into experience.

It cannot be deemed satisfactory, even by the most happy-go-lucky worker, that, say, half-a-dozen prints from one negative should emerge from the toning-bath bearing as many different tones, from brick-red to purple; or that other six prints come out of the fixing-bath, illustrating failures ranging through all the manipulations, from silvering the paper to fixing the print. These examples may be thought far-fetched; but they are true, and not too far out of the way to serve as warnings to many.

Printing is not merely placing the paper and negative together in a frame, and sticking them outside in the light.

Every print should be the best possible ; it should be beyond the excellence of the negative. To attain this, thought, skill, and attention are necessary.

Begin by anxiously studying the best methods of working, and, after a while, unconscious of effort, the right way will be the natural.

Put intelligence into the print ! It may read strangely this, as a direction for a mechanical operation. *Mechanical !* There is no such thing in photography. Even to handle a negative or frame, properly, requires skill.

Formulæ and instruction are all very well, and very useful—as they are made means to an end. After all, instruction in Art holds to Art much the same relation that the recipe for a pudding bears to the pudding itself. We would rather have the pudding—still the recipe is necessary.

In sensitising the paper, guard against the formation of air-bells under the paper. When the sheet is properly in place, lift the corners of the sheet, and break up any bubbles which may have formed.

Dry the sheet carefully and thoroughly. Guard against dust, and avoid brushing the sheet against dirty substances.

See that the paper is properly placed on the negative, that defects in the paper may not come in an important part of the picture, and that the piece of paper is large enough for the required picture. Print in the shade.

In the toning and fixing solutions move the prints about, so that they may not stick together.

Make the fixing solution alkaline, and use fresh hyposulphite solution for each batch of prints. There is no economy in a weak solution.



# English Weights and Measures.

---

## APOTHECARIES' WEIGHT. FLUID.

60 minims = 1 fluid dram.

8 drams = 1 ounce.

20 ounces = 1 pint.

## SOLID MEASURE.

20 grains = 1 scruple = 20 grains.

3 scruples = 1 dram = 60 „

8 drams = 1 ounce = 480 „

12 ounces = 1 pound.

The above weights are used by photographers. Chemicals are sold by—

## AVOIRDUPOIS WEIGHT.

$27\frac{1}{3}$  grains = 1 dram =  $27\frac{1}{3}$  grains.

16 drams = 1 ounce = 60 „

16 ounces = 1 pound = 7,000 „

---

# French Weights and Measures.

The unit of liquid measures is a cubic centimetre, “c.c.,” which measures 16·896 minims, and weighs 15·4 grains, or 1 gramme—the unit of solid measures.

1 cubic centimetre = 17 minims (nearly).

$3\frac{1}{2}$  „ „ = 1 dram.

$28\frac{2}{5}$  „ „ = 1 ounce.

100 „ „ = 3 ounces, 4 drams, 9 minims.

1,000 „ „ } = 35 ounces, 1 dram, 36 minims.  
or 1 litre

As a gramme is equal to 15·4323 grains, in order to convert grammes into grains, multiply the former by  $15\frac{1}{2}$ .

MEMS.—1 minim equals 1 drop ; 1 drachm, 1 teaspoonful ; 2 drachms, 1 dessert spoonful ; 4 drachms, 1 table spoonful. A halfpenny and threepenny piece weigh  $\frac{1}{4}$  ounce ; florin and sixpence,  $\frac{1}{2}$  ounce ; 3 pennies, 1 ounce ; 4 half-crowns and 1 shilling, 2 ounces ; 4 half-crowns, 4 florins, 2 pennies, 4 ounces. A halfpenny equals 1 inch in diameter.

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